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ABSTRACT

This report includes statistical data concerning the approximately 2,000 physicists and astronomers holding post-doctoral positions in 1973. The data cover the following areas: (1) demographic and background characteristics - sex, place of birth and citizenship, and years from degree; (2) employment characteristics - type of employer, salaries, and federal aid; and (3) subfield mobility - a comparison of the subfield of degree to the subfield of post-doctoral employment. A statistical projection regarding changes in the number of post-doctoral positions through 1980 shows a steady increase. (MLH)

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Post-Doctoral Positions in Physics & Astronomy

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POST-DOCTORAL POSITIONS IN PHYSICS & ASTRONOMY

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October 1975

By Beverly Fearn Porter

Statistical data on Post-Doctoral positions in Physics and Astronomy were obtained in two AIP surveys—The 1973 Register Survey of Physicists and Related Scientists and the 1974–75 Faculty Survey. The report *Post-Doctoral Positions in Physics and Astronomy* analyzes basic characteristics and presents projections to 1980.

Basic findings indicate:

- Nearly 2,000 physicists and astronomers, over 20% foreign citizens, were holding post-doctoral positions in 1973.
- Three-fourths of the post-docs were employed in academia.
- 80% of the post-docs were supported by federal funds, primarily from NSF and AEC (now ERDA).
- The major subfields of post-doctoral employment were elementary particles, solid state physics, nuclear physics, atomic and molecular physics, theoretical physics and astronomy.
- Nearly one-quarter of the PhDs working in elementary particles and biophysics were post-docs.
- Medical physics, biophysics and geophysics showed the greatest net gain of post-docs with backgrounds in other subfields.
- Department chairmen project virtually no increase in the number of post-docs for the 1975–76 academic year, but a substantial growth by 1980.

The report concludes that post-doctoral positions in addition to providing temporary research employment may also be functioning to counter the fluctuations in supply and demand by easing mobility between fine fields of science. Expansion of these positions in a less temporary form may act to preserve the basic research activities of young physicists and astronomers, many of whom are being frozen out of traditional academic employment.

INTRODUCTION

It can be estimated that approximately 2000 physicists and astronomers were holding post-doctoral positions in 1973.[1] This represented nearly 9% of the total PhD physics and astronomy population. Responses from 1718 of these post-docs were received in the 1973 APS-AIP Register Survey of Physicists and Related Scientists. Since these temporary post-doctoral positions have become an increasingly important source of employment in the physics[2] community during the past decade, this report will examine the basic characteristics of this group and also look at projections regarding changes in the number of post-doctoral positions through 1980.

[1] It is estimated that approximately 85% of the PhD physicists and astronomers responded to the 1973 survey. There is no evidence to suggest that post-docs responded more or less heavily than other PhDs. Thus 1718 respondents x 100/85 gives us approximately 2000 post-docs.

[2] For the purpose of brevity, physics, here and in the remainder of this report, refers to physics and astronomy unless otherwise specified.

DEMOGRAPHIC AND BACKGROUND CHARACTERISTICS

Sex

Seventy-five, or 4.4%, of the post-doctoral positions were held by women physicists, more than twice as high a percentage as women represented of the 1971–72 doctoral degree holders (2.1%). Male and female post-docs exhibit somewhat different background characteristics and employment patterns. The women post-docs received their PhDs somewhat longer ago, were more heavily employed in academia and evidenced a somewhat different distribution over subfields than the male post-docs. Women post-docs were more likely to be specializing in astronomy, atomic and molecular physics and theoretical physics, while male post-docs were more likely to be specializing in elementary particles, solid state and nuclear physics.

Place of Birth and Citizenship

Almost one-quarter of the post-docs were foreign born. Of these 390 post-docs nearly one-half were foreign citizens here on permanent visas, an additional one-third were on temporary visas while the remainder had become naturalized U.S. citizens.

Years from Degree

Figure 1 presents the distribution of post-docs by years from the PhD degree. As the figure indicates more than 80% of the

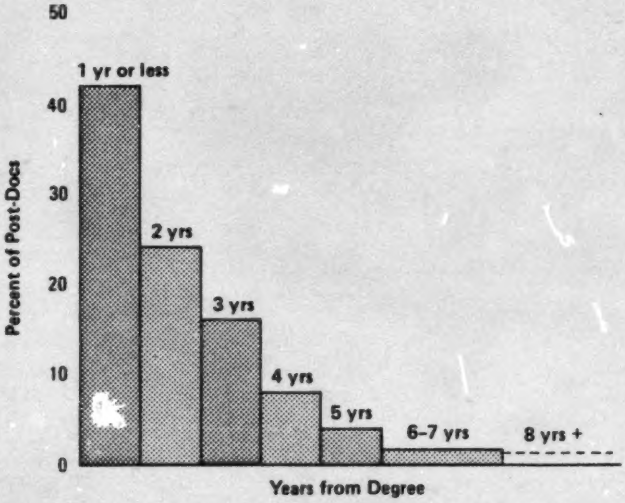

Figure 1: POST-DOCS BY YEARS FROM DEGREE

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post-docs were within three years from their PhD degree. The post-docs who were further from their degree may well have been on second post-docs, or they may have taken a post-doctoral position after interim temporary employment elsewhere. The distribution above is quite similar both for post-docs working in academia and for other types of employers with only those few employed in industry being somewhat further from degree.

EMPLOYMENT CHARACTERISTICS

Type of Employer

Table 1 presents the major types of employers for PhDs holding post-doctoral positions. While three-fourths of the post-docs were employed in universities and colleges, a substantial number were working in federally funded research and development centers, government and non-profit organizations and a few were employed in industry.

Table 1: POST-DOCS BY TYPE OF EMPLOYER

Type of Employer	Post-Docs	
	#	%
University & College	1276	75%
Industry	25	01
Government	112	07
FFR&D Centers	194	11
Non-Profit & Other	93	06
Total Known Employer	1700	100%
No Response Employer	18	

Of the post-docs above, 974, or 57%, were seeking a change in employment in the Spring of 1973.

Data from another survey to be discussed later[1] suggest that of the post-docs who did leave their positions one-fourth accepted another post-doctoral position, about one-third found other academic positions, 30% went to industry or government and 11% went elsewhere.

One can determine whether the post-doctoral experience had an effect on ensuing patterns of employment by comparing those post-docs who went into regular employment, i.e., excluding those who took another post-doctoral position with a group of non post-docs who received their degrees at approximately the same time, as illustrated in Table 2.

Table 2: EMPLOYER DISTRIBUTION OF PhDs LEAVING POST-DOCTORAL POSITIONS IN 1972-73 AND A COMPARABLE GROUP OF NON POST-DOCS

	Departing Post-Docs in 1972-73	Non Post-Docs (1970-71 Degree Recipients)
	%	%
Type of Employer		
Academic	46%	47%
Industry	23	26
Government	17	14
Other	14	13
Total	100%	100%

The similarity in employer distributions is striking, with the departing post-docs being only slightly less likely to enter industrial employment. Apparently the post-doctoral experience did not channel the departing post-docs into employer areas much different from those of other young PhDs. In contrast to older PhDs, both of the above groups were somewhat more likely to be employed by government and less likely to be academically employed.

Salaries and Federal Support

The salaries which post-docs earned varied considerably by type of employer as illustrated in Table 3.

Table 3: POST-DOC SALARIES BY TYPE OF EMPLOYER

Type of Employer	Post-Doc Median Salaries
University & College	$10,400
Industry	$17,100
Government	$13,600
FFR&D Centers	$12,100
Non-Profit & Other	$ 9,500

These salaries are all lower than those for other comparably recent PhDs working for the same types of employers, with the salary differences being the greatest for those working in FFR&D centers and non-profit organizations and least for those working in industry.

Federal funding was the major source of support for these post-docs. Over 80% of them stated that their work received some federal support. Table 4 presents, for those who were federally funded, the percentage of their work which this funding supported.

Table 4: PERCENTAGE OF POST-DOC WORK SUPPORTED BY FEDERAL FUNDING

Percent of Work Federally Funded	Post-Docs	
	#	%
100%	972	76%
75	142	11
50	110	08
25	31	03
less than 25%	17	01
Total Known	1272	100%
Do not know or no response percent funded	113	

In the vast majority of cases the post-docs' work was completely federally funded.

The source of this support came from a variety of federal agencies. Figure 2 illustrates the primary agencies of federal support.

NSF and AEC (now ERDA) were clearly the major agencies supporting post-doctoral physicists. The distribution primarily reflects the pattern of support for university post-docs since they make up the largest proportion of the post-doctoral pool. There

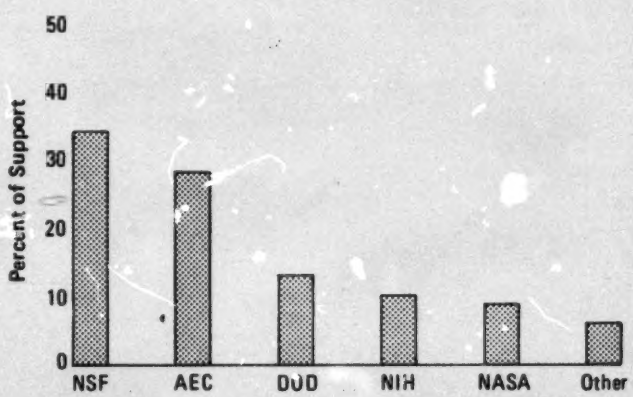


Figure 2: FEDERAL AGENCIES' POST-DOCTORAL SUPPORT

[1] See section IV – *Projections* for a description of the survey upon which these figures are based.

was some variation in federal support among other post-doc employers. In the federally funded research and development centers 2/3 of the post-docs were supported by AEC. In the non-profit organizations 1/3 of the federally funded post-docs were supported by NIH. The government post-docs were more likely to be supported by DOD, NASA and a scattering of other agencies and less likely to be supported by AEC and NSF. Only a very few of the industrially employed post-docs were supported by federal funds.

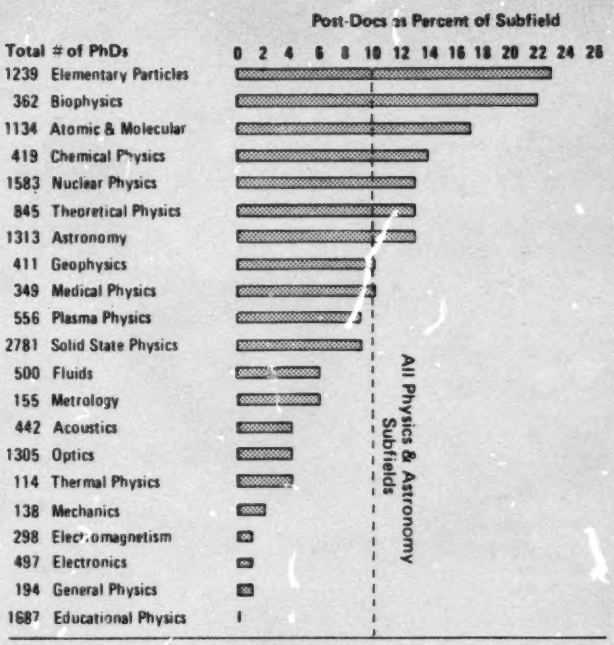
Subfields of Post-Doc Employment

Post-docs were working in many different subfields of physics, astronomy and related sciences. In some areas they made up a substantial proportion of the total PhDs employed as figure 3 illustrates.

A high proportion of the PhDs working in elementary particles, biophysics and atomic and molecular physics were holding temporary post-doctoral positions. On the other hand few of the PhDs working in educational and general physics or such more applied physics areas as electronics, mechanics, acoustics and optics were holding post-docs. Of physicists working outside of physics in other science or non-science areas very few were holding post-doctoral positions, with the notable exception of those working in the biological and biomedical area.

Table 5 examines the percent of post-docs in each subfield by type of employer.

Almost three-fourths of the post-docs are employed in six subfields: elementary particles, solid state physics, nuclear physics, atomic and molecular physics, astronomy and theoretical physics. The distribution of post-docs by subfield varies within the different types of employers. Industry, with its relatively small number of post-docs, has but a few subfields represented, solid state physics, optics, and atomic and molecular physics being the primary ones. Among government post-docs astronomy, solid state physics, plasma physics, geophysics and acoustics were more predominant as subfields of employment than they were for the total post-doc group. In the federally funded research and development centers, elementary particles and nuclear physics were more pre-



*For PhD physicists working in other fields, the % who were post-docs were as follows: Bio & Biomedical Sci. 24%, Psych. 17%, Earth Sci. 13%, Environmental Sci. 6%, Chemistry 5%, Education Non-Science 4%, Other Science 2%, Government 2%, 'Other' 2%, Computer Science 1%, Engineering 1%, Other Science Education 1%.

Figure 3: POST-DOCTORAL REPRESENTATION IN PHYSICS & ASTRONOMY SUBFIELDS

Table 5: POST-DOCTORAL DISTRIBUTION BY EMPLOYER AND SUBFIELD

Subfield of Post-Doctoral Employment	Total Post-Docs* %	Type of Employer: Academic %	Industry %	Government %	FFR&D %	Other %
Elementary Particles	17%	15%	–	6%	30%	24%
Solid State Physics	16	16	30%	23	12	11
Nuclear Physics	12	12	–	4	19	4
Atomic & Molecular	12	12	20	12	7	7
Astronomy	10	9	5	18	10	19
Theoretical Physics	7	8	–	3	2	3
Biophysics	5	5	–	4	2	8
Chemical Physics	4	3	5	6	3	4
Plasma Physics	3	3	10	6	4	–
Optics	3	3	20	1	3	1
Geophysics	2	2	–	5	2	2
Other Sciences	2	2	10	3	4	3
Medical Physics	2	2	–	1	1	8
Fluids	2	2	–	3	1	1
Bio & Biomedical Sciences	1	1	–	1	1	2
Acoustics	1	1	–	4	1	1
Metrology	1	a	–	1	2	1
Educational Physics	1	1	–	–	–	–
Thermal Physics	a	a	–	–	–	–
Electronics	a	a	–	–	–	–
Electromagnetism	a	a	–	–	–	–
Mechanics	a	a	–	–	–	–
General Physics	a	a	–	–	–	–
Total Known %	100%	100%	100%	100%	100%	100%
#	1663	1250	20	107	190	91
No Response Subfield	55	26	5	5	4	2

* includes no response employer
(a) less than 1%. (–) none

dominant while in the nonprofit organizations, astronomy, elementary particles, medical physics and biophysics were more predominant as subfields of post-doctoral employment.

A further breakdown of detailed specialties of post-doctoral employment in industry, government and non-profit organizations is presented in the appendix of this report, since post-doctoral employment is not as familiar a phenomena in these areas as in academia or the FFR&D centers.

SUBFIELD MOBILITY

Three-fourths of the post-docs held positions in the same subfield as their PhD degree. However there is considerable variation in extent and balance of in and out mobility by subfield as illustrated in Figure 4 and Table 6.

Theoretical physics, nuclear physics, elementary particles and solid state physics showed the heaviest net outflow, i.e., the percent leaving these subfields for post-doctoral positions in other areas was considerably higher than the percent entering post-doctoral positions in these subfields with backgrounds in other areas. These are the major feeder subfields of physics. Not only do they train PhDs to work in their particular subfield but they provide PhDs for work in a broad variety of other subfields. This holds not only in the post-doctoral situation being discussed here, but also in other PhD employment reflecting the flexibility of

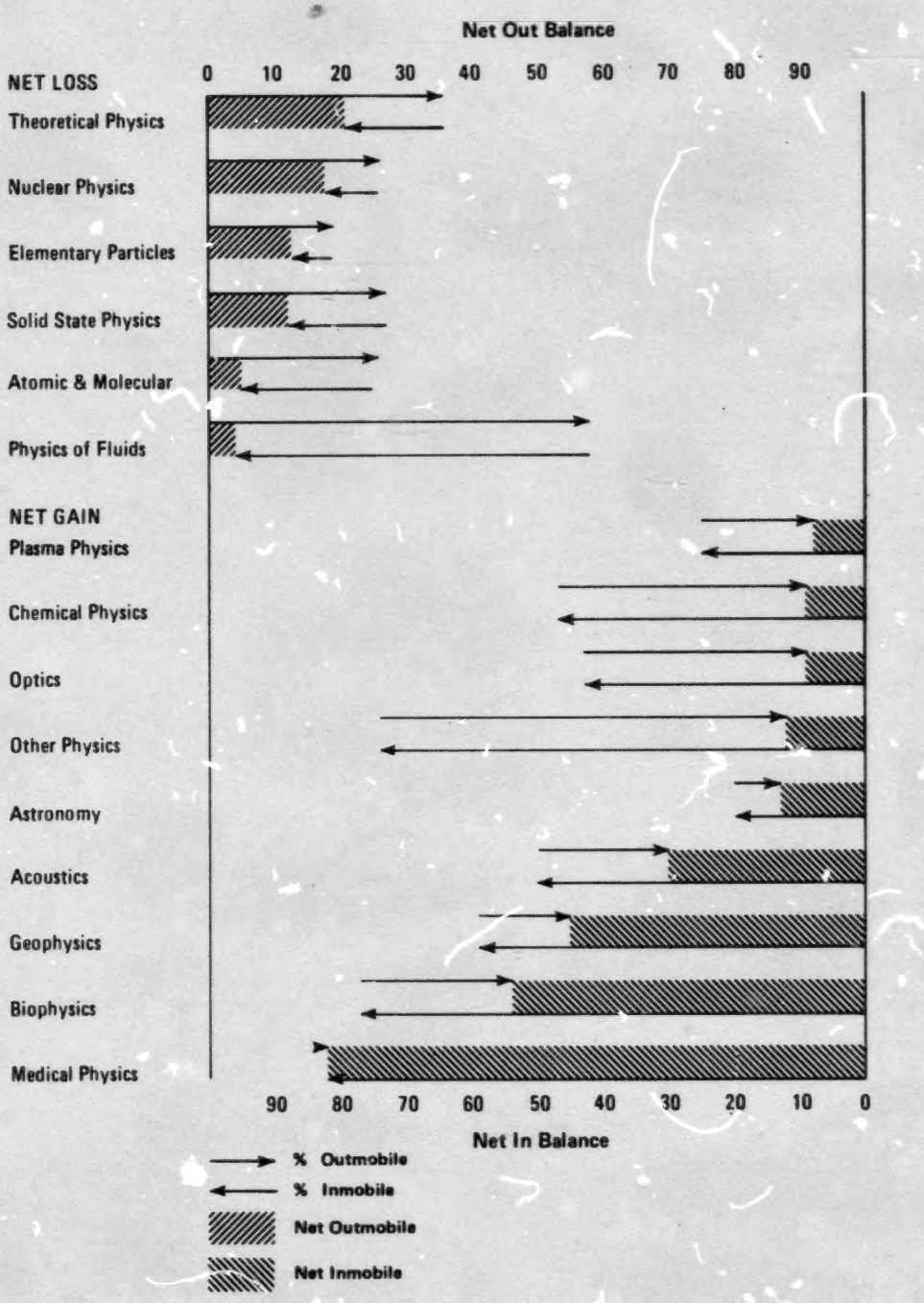


Figure 4: POST-DOC MOBILITY BY SUBFIELD

Table 6: POST-DOC MOBILITY--SUBFIELD OF DEGREE TO SUBFIELD OF POST-DOCTORAL EMPLOYMENT[1]

Subfields[2] - Net Loss + Net Gain		(a) Total Post-Docs from Subfield of Degree	(b) Leaving Subfield of Degree for Post-Doc in Other Area # as % of (a)	(c) Subfield of Degree and Post-Doc Employment Same #	(d) Fraction of Employed Post-Docs with Degree in Other Subfields # as % of (e)	(e) Total Post-Doc in Subfield of Employment
Theoretical Physics	-	148	36%	94	15%	110
Nuclear Physics	-	242	26	178	3	194
Elementary Particles	-	318	19	257	6	274
Solid State Physics	-	299	27	217	15	256
Atomic & Molecular	-	202	26	149	21	188
Physics of Fluids	-	31	58	13	54	28
Plasma Physics	+	47	17	39	25	52
Chemical Physics	+	50	38	31	47	58
Optics	+	38	34	25	43	44
Other Physics[3]	+	24	62	9	74	34
Astronomy	+	145	7	135	20	169
Acoustics	+	10	20	8	50	16
Geophysics	+	20	15	17	59	41
Biophysics	+	22	23	17	77	74
Medical Physics	+	6	0	6	82	33
Total Physics[4] & Astronomy		1602	25% (407)	1195	24% (376)	1571

[1] Numbers refer only to those indicating both subfield of degree and subfield of post-doc work.
[2] The subfields are ordered from those having the greatest net loss to those having the greatest net gain. Net change = percent entering - percent leaving, ie., column d - column b.
[3] Other physics includes mechanics, thermal physics, metrology, general physics, electronics, electromagnetism and educational physics.
[4] An additional 58 PhDs took post-docs in other science fields: 19 in biology, 13 in earth and environmental science, 7 in engineering, 6 in chemistry, and 13 in other areas and 27 post-docs had received their degrees in other science fields, 19 in chemistry, 3 in engineering, 2 in biology and 3 in other science.

traditional physics training

At the other extreme medical physics, biophysics, geophysics, acoustics and astronomy showed the heaviest net gains of post-docs. Many more PhDs were entering than leaving these areas. In fact in the first three subfields mentioned there were more post-docs who entered with backgrounds in other areas than had been trained in the subfield itself. These interdisciplinary and applied subfields are among the most rapidly growing areas of physics.[1] Apparently a number of PhDs trained in other areas have decided to use the post-doc route in order to develop the supplementary research background needed to function well in these expanding areas. In addition direct training at the PhD level in the first three interdisciplinary areas has not yet approached employment opportunities and thus a heavy influx of PhD's with other training would be expected.[2]

One should also note from the figure and table that gross mobility, i.e., the percent moving either in or out, also varies by subfield. Thus a subfield such as physics of fluids which shows a small net loss is an extremely volatile area losing over half of its post-docs to other subfields and gaining over half from other subfields. Most of the subfields which evidence this pattern relatively heavy out and in mobility--are subfields where post-doctoral positions have not been traditional. PhDs trained in the area are thus not likely to continue their work with post-doctoral positions in the same area. If they do take a post-doctoral position it is to enable them to move to another area of physics--making for heavy post-doc outmobility. On the other hand some of these areas, optics for example, have begun to grow in attractiveness and some PhDs have chosen the post-doc route to develop the needed background--making for heavy post-doc immobility.

It has been observed by Grodzins that some mismatch between subfield of training and employment exists for PhD physicists[1]. And to a certain extent this is true. However, as we have discussed in this section the temporary post-doctoral position acts, at least for some PhD physicists as a retraining or perhaps better, expanded research training period--easing their transition from one to another physics subfield thus aiding in the flexibility needed to balance the variations in supply and demand[2].

However, we need to remember that 75% of the post-doctoral positions being discussed here are in the same physics subfield as the subfield of degree. Some of these are to develop expanded abilities, but clearly some are simply holding positions--a waiting till a full fledged employment position comes along. In the next section on projections we will consider whether some of these present 'holding positions' will become new roles of the future--roles which may well act to sustain the healthy growth of the basic physics enterprise.

[1] Astronomy is, of course, a separate field from physics but, particularly in the areas of astrophysics it interrelates so closely with physics that the two fields are usually discussed together.

[2] Medical physics, in fact, is still so underrepresented as a subfield of PhD training that it has yet to appear on the National Research Council's Doctorate Record File as a specified subfield.

[1] See L. Grodzins, "Where Have All the Physicists Gone?", Newsletter of the Forum on Physics & Society, APS, Volume 4, Number 1, Feb. 1975.

[2] As mentioned in the fourth footnote to table 6, some physics PhDs have taken post-doctoral positions in other fields of science (many more than the reverse). Here too, the post-doctoral position may be seen as a transition mechanism. These figures have not been presented in the same detail as those for the physics subfields--since representation in these areas is incomplete.

PROJECTIONS

In the Fall of 1974, questionnaires were sent out to all U.S. College and University physics and related science departments listed in the AIP Faculty Directory. Department Chairmen were asked to provide figures on faculty members and post-doctoral positions for the 1974–75 academic year, and one or two preceeding years and to estimate projected figures for 1975–76 and 1980. The population of post-doctorates covered in this survey is limited to those employed in academic or academically affiliated institutions and differs somewhat from the population described earlier based on Register Statistics. Comparing the figures on number of post-docs from the faculty survey for 1972–73 and from the 1973 Register Survey, it appears that about 82% of the total population of post-docs was covered in the faculty survey. Included were post-docs working in physics and astronomy departments, about 60% of the physics and post-docs working in related science departments and probably a high proportion of those post-docs employed by federally funded research and development centers and non-profit organizations affiliated with universities.

Assuming the coverage of 82% is constant for the different years dealt with in the faculty survey, the following estimates and projections for total number of post-docs can be made.

In the early seventies, 72-73 to 75-76, the increase in number of post-docs is slight, averaging about a 1.4% increase per year. In fact, as indicated on the Table the smallest increase is projected for the coming academic year, 1975–76. Yet looking at the figures for 1980 a considerably larger expansion of post-docs is projected by department heads.[1] Part of this anticipated growth is due to an expected increase in the average number of post-docs per department. Almost one-half (45%) of the departments which now have post-docs expect an expansion in post-doctoral positions by 1980. Most of the remaining departments (51%) expected no change in the number of positions with only a very few departments (4%) expecting a decrease in the number of positions. Another part of the projected increase in post-doctoral positions, is due to an expected increase in the number of departments with post-docs. Of the 208 departments who had no post-doctoral positions in 1974–75, 18% were expecting to establish some by 1980.

The projected substantial increase in number of post-doctoral positions appears somewhat surprising. The number of physics PhDs produced in the U.S. has been declining since the peak year in 1969–70 and is expected to level off at around 930 per year by 1980. Also there is little expectation that an increasing number of foreign graduates will hold post-doctoral positions.

This lowered production combined with the projected increase in post-doctoral positions would, if the current length and number of multiple post-docs were maintained, suggest that over 80% of the new PhDs in 1980 would be holding post-doctoral positions—a rather unlikely situation.

It is possible that the department chairmen have been over-optimistic in their projections for the future. However, assuming that the projections have some basis in reality it is also possible that they imply a change in the nature of the post-doctoral position itself. At the present time about one-fourth of the post-docs leaving a given position accept another post-doctoral position. This pattern of multiple sequential post-docs could well increase by 1980. In addition two-thirds of the new post-docs in 1974 held a given post-doc position for two or more years, up from 56% the preceding year. Longer post-docs may then also be increasing by 1980. This would mean a larger proportion of the total PhD population would be holding post-doctoral positions, but many of them would not be new PhDs.

The above expansion of non-faculty research positions, although somewhat speculative, does fit in with the expected decline in faculty, particularly junior faculty members. Expansion of post-doctoral positions, then, may become a mechanism for preserving the basic research activities of the younger physicists. The problem of funding such positions, of course, is still open to question.

CONCLUSION

Temporary post-doctoral positions provide an important source of research employment for PhD physicists and astronomers, particularly for recent degree holders. It is possible that such positions may even expand in the future to compensate for the expected decline in junior faculty who have traditionally been major contributors to the basic research effort in physics and astronomy.

In addition to providing research opportunities, post-doctoral

[1] In most cases the projections were made by department chairmen, although some were made by administrative assistants or other staff members.

Table 7: ESTIMATED AND PROJECTED NUMBER OF POST-DOC PHYSICISTS 1972-1980*

	1972-73	1973-74	1974-75	Projected 1975-76	Projected 1980
Academic Depts. with Post-Docs	208	210	210	211	247
Number of Post-Docs from Academic Survey	1657	1672	1716	1726	2096
Total Post-Docs (inflated 100/82)	2021	2039	2093	2105	2556
Yearly % Change		.9%	2.6%	.6%	~5% growth yearly

* Of the PhD producing departments (where the vast majority of Post-Docs were located) approximately 80% responded to the survey. To develop an estimated population figure for post-docs, non-responding departments were given the average number of post-docs in departments with similar size faculties. (A correlation of .64 had been found between faculty size and number of post-docs.) In addition some of the departments who responded did not provide data on the number of post-docs for one or more of the above years. Similar estimates based on faculty size were also made for these departments with an attempt to keep the figures consistent when partial responses to post-docs in some years had been given.

positions also function for some PhDs as a mechanism of flexibility, aiding them in their mobility from one scientific field, or physics subfield to another. With supply and demand in fine-fields often rapidly fluctuating, such flexibility becomes an extremely important factor in the optimum utilization of physics manpower. Although most post-doctoral positions are academic, a substantial number of non-academic ones also exist. Further development of these non-academic post-doctoral positions may help to encourage the closer linkage between basic and applied research efforts which is vitally needed for the continuation of a healthy scientific enterprise.

Because of the important role post-doctoral positions play in physics and astronomy research, it is vital that changes in this role continue to be monitored. It is hoped that surveys of post-docs will continue to be supported both within the physics community in order to obtain the important fine-field data, and at the national level for comparisons between broad scientific fields.

APPENDIX

1. Specialties of Industrial Post-Doctoral Employment

Atomic and Molecular Physics	4
Quantum Chemistry	
Electron Paramagnetic Resonance	
Molecular Spectroscopy (2)	
Chemical Physics	1
Optics	4
General Optics	
Lasers	
Non Linear Optics	
Quantum Electronics	
Plasmas	2
General Plasmas	
Gas Discharge	
Solid State	6
General Solid State (2)	
Electronic Energy States	
Ferromagnetism	
Lattice Defects and Diffusion	
Optical Properties	
Other	3
Radio Astronomy	
Chemistry	
Nuclear Engineering	
Total Known	20
No Response	5

2. Specialties of Government Post-Doctoral Employment

Acoustics	4
Noise	
Underwater Sound (2)	
Other	
Atomic and Molecular	13
General Atomic and Molecular (3)	
Atomic, Ionic & Molecular Beams	
Atomic Structure & Spectra (2)	
Quantum Chemistry	
Impact and Scattering Phenomena (2)	
Molecular Spectroscopy, Electronic (3)	
Molecular Spectroscopy, Vibration Rotation	
Biophysics	4
General Biophysics	
Biomedical Engineering	
Biotransport, Membrane Physics	
Molecular	
Chemical Physics	6
Chemical Kinetics, Gas Phase (4)	
Surface Properties (including some catalysis) (2)	
Elementary Particles	7
General Elementary Particles	
Cosmic Rays (3)	
High Energy Phenomena (2)	
Strong Interaction Processes	
Geophysics	5
Atmosphere Structure & Dynamics (4)	
Geomagnetism & Electricity	
Medical Physics	1
Nuclear Physics	4
Nuclear Reactions & Scattering (2)	
Radiation Effects	
Other	
Optics	1
Other	
Fluids	3
Compressible Fluid Dynamics	
Structure & Properties of Fluids	
Turbulence	
Plasmas	7
General Plasmas (2)	
Plasmas Theory (3)	
Plasmas Confinement	
Other	
Solid State	25
General Solid State (5)	
Crystallography (3)	
Dynamics of Crystal Lattices	
Electronic Energy States	
Ferromagnetism	
Lattice Defects & Diffusion (2)	
Mossbauer Effect (3)	
Optical Properties (3)	
Physical Properties of Materials (2)	
Phonons	
Semiconductors (2)	
Surface Structure & Kinetics	
Theoretical Physics	3
Statistical Mechanics (3)	
Metrology	1
Spectroscopic Techniques & Instrumentation	
Astronomy & Astrophysics	19
General Astro & Astro (3)	
Galaxies	
Magnetospheric Particles & Waves	
Origin of Cosmic Rays	
Physics of Interstellar Medium (2)	
Radio Astronomy (2)	
Space Astronomy	
Spectroscopy of Astronomical Sources (2)	
Theoretical Astrophysics (3)	
Other (3)	
Biological & Biomedical Sciences	1
Computer Science	1
Earth Science	1
Other Science	1
Total Known	107
No Response	5

3. Specialties of Post-Doctoral Employment in Non Profit Organizations

Acoustics	1
Ultrasonics	
Atomic and Molecular	6
Atomic, Ionic and Molecular Beams (3)	
Quantum Chemistry	
Impact and Scattering Phenomena	
Macromolecules	
Biophysics	7
General Biophysics	
Biomedical Engineering	
Biotransport, Membrane Physics	
Molecular (3)	
Other	
Chemical Physics	4
General Chemical Physics (2)	
Surface Properties (including some catalysis)	
Other	
Elementary Particles	22
General Elementary Particles (6)	
Cosmic Rays	
Electromagnetic Processes (3)	
Field Theory	
High Energy Phenomena (3)	
Strong Interaction Processes (5)	
Weak Interaction Processes (2)	
Other	
Geophysics	2
Oceanography	
Seismic Waves	
Medical Physics	7
General Medical Physics (5)	
Radiation	
X-Rays	
Nuclear Physics	4
Nuclear Properties	
Nuclear Spectroscopy (3)	
Optics	1
Interferometry	
Fluids	1
Quantum Fluids	
Solid State	10
General Solid State (2)	
Crystallography	
Electron Diffractions	
Electronic Energy States (2)	
High Polymers & Glasses	
Optical Properties	
Photoconductivity & Related Phenomena	
Semiconductors	
Theoretical Physics	3
Mathematical Physics	
Solid State (2)	
Metrology	1
Spectroscopy Techniques & Instrumentation	
Astronomy & Astrophysics	1[illegible]
General Astro & Astro (5)	
Lunar & Planetary Geophysics, Geology	
Magnetospheric Particles & Waves	
Origin of Cosmic Rays (2)	
Photometry of Astronomical Sources	
Radio Astronomy	
Spectroscopy of Astronomical Sources (2)	
Theoretical Astrophysics (3)	
Other	
Biological & Biomedical Sciences	2
Earth Science	1
Engineering	1
Nuclear Engineering	
Environmental Sciences	1
Total Known	91
No Response	2